

Prospectus on Tandy Hills Stratford Natural Area

Tandy Hills/Stratford Natural Area

In 1987 citizens began to urge the City of Fort Worth Park and Recreation Department to protect the Tandy Hills/Stratford Natural Area (TH/SNA) from off-road vehicles and dumping, and to determine the value of this area in terms of its natural history. Staff from the Fort Worth Nature Center and Refuge (FWNC&R) were asked by Fort Worth Park and Recreation Department (FWP&RD) to examine the two parks to determine if the land warranted special consideration as a natural area. After four initial visits the FWNC&R staff recommended that the two parks did merit status as a natural area and suggested further study.

The initial Environmental Assessment of Tandy Hills Park was completed in 1989 and shortly thereafter the FWP&RD recommended to the Park Board that protective cable be installed on the park perimeter and that management of the park be turned over to the Nature Center staff. The addition of Tandy Hills/Stratford Park to the Nature Center added 160 acres to the 3500 of urban natural area or approximately 1/3 of existing parkland in Fort Worth. Continual surveying of flora and fauna, trail routing, land condition and research into methodology of natural area managerial and restoration have been the major effort by FWNC&R staff since 1990.

Natural Area and the Mission of FWP&RD

What was once commonplace 150 years ago is now a rarity, and much like artifacts in a museum, Tandy Hills is desirable for preservation and viewing by the public. The preservation and management of Tandy Hills/Stratford Park is congruent with the mission of FWP&RD, to enrich the lives of our citizens through the stewardship of our resources and the responsive provision of recreational, cultural, and educational opportunities. It is also consistent with the goal of conservation and preservation, “to effectively and efficiently plan for the managed natural and developed areas.” TH/SNA can fulfill a part of the mission and goals of FWP&RD by providing a valuable natural resource, providing recreation through trails and related activities, and with educational programming. Due to the inherent differences between natural areas and other parks within the system, a land use plan must use appropriate methods that will protect and enhance Fort Worth natural areas and remain consistent with the mission.

Which activities any given natural area can tolerate depends on how large the tract is, how resilient and sensitive to disturbance its native habitats and components are, how much disturbance has already occurred, and what kinds of monitoring and habitat protection capabilities the managing entity has. Some natural areas (or parts of) are fragile enough to justify allowing no public access at all while others may allow access only by guided tour. Many natural areas restrict access to include only people and do not allow pets of any kind--leashed or loose. Other tracts may allow limited access to pets and may require them to be leashed. Ecological impacts from visitor use can vary widely depending on many factors. **The impacts can be foremost in a plan for a natural area such as TH/SNA is that the resource must be protected based on sound and current management techniques using site-specific survey data.** Public access must be secondary to the site protection.

Description of TH/SNA

TH/SNA is a 160-acre area of public land that is owned by the City of Fort Worth and is situated on prairie land which gently slopes northward draining toward the Trinity River. Tandy Hills is a relic of the original Grand or Fort Worth Prairie showing minimal disturbance with most of the original plant species intact. Stratford has had a different land use history from that of Tandy Hills; most of the original prairie is replaced by invasive tree species. The range of ecological quality requires a distinct management plan for each site.

Three soil types are found at TH/SNA: Aledo, Aledo-Bolar and Frio. Each of these soil types has a characteristic natural plant community (as determined by the U.S. Soil Conservation Service) which gives the base line for judging the condition of each site and determines the disturbance (if any). The Aledo soil is situated on the upper shelves of high ground. The climax plant community should be a prairie of mid and tall grasses interspersed with an abundance of forbs (wildflowers). By weight, the composition is 95% grasses, 5% forbs, and 0% trees. Little bluestem makes up about 45% of the composition and Indian grass, big bluestem, and switchgrass make up 15%. Other grasses are sideoats grama, tall dropseed, slim tridens, silver bluestem, Texas cupgrass, hairy grama, buffalo grass, Texas wintergrass, and vine-mesquite. Forbs are numerous and include purple paintbrush, Engleman daisy, prairie clover, Maximillian sunflower, heath aster, compass plant, golden dalea, penstemen, and gay feather occurring as some of the more noticeable species.

The Aledo-Bolar soil is on the slopes with occurrences of Aledo soils (described above) within Bolar soils. The Bolar soil climax plant community is true prairie consisting mainly of tall grasses. The composition by weight is about 90% grass, 5% forbs, and 5% woody plants (trees or shrubs). Little bluestem, switchgrass, big bluestem and Indian grass make up about 70% of the vegetation. Other grasses are wild rye, sideoats gramma, Texas wintergrass, vine mesquite, Texas cupgrass, white tridens, meadow and tall dropseed, and silver bluestem. Forbs include Engleman daisy, Maximillian sunflower, prairie clover, heath aster, salvia, purple coneflower, golden dalea, big top dalea, gay feather, and bundle flower. Woody vegetation includes elm, hackberry, plum, live oak, aromatic sumac, New Jersey tea, and white honeysuckle.

The Frio soil occurs in the creek bottom in the lower reaches of the TH/SNA. The climax plant community for the Frio soil is mid and tall grass with a tree canopy of pecan, elm, bur oak, cottonwood, and others shading about 25% of the ground. The vegetation is 70% grasses, 20% woody plants, and 5% forbs. Little bluestem, big bluestem, Indian grass, switchgrass, purple top tridens, and wild rye make up most of the grasses. The rest of the grasses are tall and meadow dropseed, vine mesquite, Texas blue grass, and beaked panicum. Forbs include Engleman daisy, maximillian sunflower, gay feather, dalea, penstemon, and tick clover.

The preceding plant community descriptions are not restoration models but do give an approximate view of the original landscape and provide a starting point for site specific plant and ecological monitoring.

Model for Ecological Monitoring

The natural resources found in Fort Worth natural areas include, complex organisms, processes, and systems. Because the understanding of these resources is far from complete, research, mitigation, and monitoring are used to provide information needed to make sound park management decisions.

1. **General Plant Survey.** A general plant survey was performed in 1988-89 and compared to the classic monograph, "Vegetation of the Fort Worth Prairie". The vegetation of Tandy Hills was found to be mostly native prairie species. Stratford was not part of this general survey and has yet to be inventoried. The general plant survey lists only the species found on site and not numbers or importance of species within the plant community.

2. **Plant Transects.** Various techniques are used to determine the percentage of plants and their importance in the plant community. By utilizing this baseline data a view of the actual existing plant community can be developed. With this view as a point to start from, a management scenario can be formatted. All future management, climate change, visitor impact, and future changes in the natural community can be gauged against this data. The plant transects should be performed quarterly.
3. **Wildlife.** Depending on what is considered wildlife (non-plants?), a wildlife survey is the next step after or during plant transects. Generally birds, mammals, reptiles, amphibians, fish, insects, and invertebrates are observed or sampled. Wildlife responds to changes in vegetation, management practices, and visitor density. Once a baseline wildlife inventory is developed, an initial management plan can be adjusted to accommodate the needs of wildlife. Birds are the easiest to sample because of the relative ease of viewing. Other organisms need to be captured. As with plants, this data collection must be on-going.

Impacts

Disturbances to plant and animal communities comes from both natural events (flooding, drought, fire, etc.), and human-derived events (grazing, logging, vehicles, etc.). The timing of an impact or disturbance can be historical or recent. Historical disturbances are events that happened more than 30-50 years ago and recent events are those from 30 years ago to present. Both Tandy Hills and Stratford have disturbance impacts. Both sites have impacts from human sources and include grazing, vehicles, and adjacent development.

Tandy Hills is in very good shape with the main impacts or disturbances being recent vehicle traffic and invasion of tree species from light grazing and lack of fire. (Note: lack of fire in a prairie is considered a disturbance).

Stratford shows signs of an older and more severe impact. Probably by the turn of the century, it had been heavily overgrazed and the resultant tree invasion has altered the plant and wildlife communities.

Both areas (particularly Tandy Hills) have been impacted by recent vehicular usage. Moderate to severe erosion and compaction has occurred in recent times on a network of trails throughout the area but has mostly diminished due to the protected boundaries. There are two utility lines that pass through the park; a water main and a sewer line. Some of the damage has been caused by the lines and related vehicular activity. Erosion continues on many sites but at a much-reduced pace.

Minor impacts are related to the surrounding residential community. Non-point source pollution from home pesticide use, domestic pets, dumping of grass clippings, escaped non-native plants, and unplanned trails are examples of this type of disturbance.

Trails

A primitive hiking trail system exists within the area on the old vehicle paths. Most of these trails traverse the land in such a manner as to enhance erosion and impact sensitive areas that may be wet (seeps and springs) or have important or sensitive plant species nearby. During the general survey work performed in the past, possible trail routes have been explored and notes taken on areas to avoid. Approximately one and one half to three miles of interpretive and hiking trails are possible within the area.

Trail routing and construction would be patterned after the trails on FWNC&R. Trails would be surfaced using the natural material on site except where special sites existed such as seeps or streams. Special drainage amendments are used to slow or eliminate trail tread erosion.

Interpretation

Since the initial interest in TH/SNA the FWNC&R has conducted educational programming on a limited basis. Special spring and fall tours, instruction of special interest college classes, and various newsletter articles have been the thrust of this programming.

The potential for interpretive programming and resource oriented non-structured recreation is high for TH/SNA. Considering the population of the metroplex, the increasing desire to learn about or experience the environment, and the area's downtown location the possibilities are limited only by the FWNC&R staff time and inspiration.

Specific Recommendations

1. Continue general plant survey and begin plant transects.
2. Begin general wildlife survey.
3. Use FWNC "TRIAGE" method for selecting management needs.
4. Begin brush removal in selected areas.
5. Access erosion areas and develop restoration plan.
6. Layout proposed trail system.
7. Produce interpretive brochure and trail map.
8. Conduct quarterly programs, and encourage special use by local schools.
9. Use signage and other methods to reduce impact by visitors and the surrounding neighborhood.
10. Promote TH/SNA as a local treasure to travelers visiting the City of Fort Worth.
11. Require prior authorization by FWNC&R staff to any activity by any city department with the exception of real emergencies.
12. Continue mowing of ball field, playground, and areas adjacent (6') to street as to FWP&RD policy. Other mowing only as dictated by needs to protect or enhance the plant community or special projects.
13. Develop a Natural Area Quality Index based on the floristic components of TH/SNA that would allow comparison of areas within the boundaries and provide a method of accessing other natural areas in Fort Worth.

Costs

The FWNC&R is currently planning similar natural area management techniques and in general apply to TH/SNA and future natural areas in the Fort Worth region. Since the FWNC&R has had no official management plan, the work performed has been erratic and mostly accomplished with volunteers. The cost estimates will be based on the limited efforts at FWNC&R and other sources.

A general cost estimate for natural areas (based on Dallas County Open Space) is around \$85-\$100 an acre per year. This would amount to \$13,600-\$16,000 annually. This annual figure is approximately 70% labor, 20% equipment, 10% materials. In actuality the cost per acre would be higher (because each acre does not need the same amount of work) due to the labor intensive projects and special tools and supplies. A cost of \$900-\$1,000 per mile of trail is a rough estimate for trail construction using park personnel. If volunteers were used the costs decrease considerably. Chemicals and material cost alone could run \$100-\$400 per acre in areas where brush is dense.

FWNC&R staff time would average a minimum of 8 hours a week with a cost of approximately \$20/hour or \$8,320. Detailed study would raise the time requirements, but some of this could be done by area graduate students or other professional volunteers.

Cost Estimates

Annual (1st year, plant survey, trail layout, limited brush clearing) \$14,000
Labor @ 70% (minimum 1 staff planner, limited brush clearing) \$9,800
Equipment and materials @ 30% \$4,200

As FWNC&R and TH/SNA projects are completed an accurate cost estimate can be developed for future management plans. Costs of interpretive programming were not included, as they have been in the past provided by FWNC&R. If four programs per year were planned for and presented that cost could be estimated at \$2,000 staff time and mileage.

**First Annual Report
Environmental Assessment
Of Tandy Hills Park
January 1989**

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Fort Worth Nature Center and Refuge

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Introduction

The environmental assessment in the following pages began in the summer of 1987 and was formally proposed by the Director of Park and Recreation, Ralph W. Emerson, to the Park and Recreation Advisory Board on February 11, 1988. The assessment also updates the preliminary report requested by Assistant Director of Programs, Jack Ashworth, in May 1987.

The questions to be asked in regards to the Tandy Hills/Stratford area are: “What is actually in the parks? Is it a special natural area? How might the natural areas be managed?” These questions will be addressed in the following report, but first let us consider the natural history of the Fort Worth region.

Although there is an incredible array of plants, animals, and natural communities, which may be found in Texas, natural scientists generally recognize ten vegetational areas, or bio-geographic areas, which represent the broad changes in plants and animals across the state. The areas are as follows: 1. Pineywoods 2. Gulf Prairies and Marshes 3. Post Oak Savana 4. Blackland Prairie 5. Crosstimbers and Prairies 6. Rio Grande Plains 7. Edwards Plateau 8. Rolling Plains 9. High Plains 10. Trans-Pecos, Mountains and Basins. Fort Worth is situated in region 5, Crosstimbers and Prairies.

The Crosstimbers and Prairies consist of two vegetational types: Post Oak/Blackjack Oak woodlands and Prairie grasslands. The Crosstimbers border the eastern and western edges of Fort Worth and runs north and south from Central Texas to the Red River. The Prairie runs between these two belts of woodlands. The Trinity River crosses through the Crosstimbers and Prairies and in its basin creates riverbottom forests. The major part of the Fort Worth city limits is in the Prairie region which is sometimes referred to as the Fort Worth Prairie. Tandy Hills/Stratford parks are in the eastern portion of the Fort Worth Prairie.

What are grasslands and prairies? Grasslands occur on all continents and together with the grazing animals that co-evolved with them, constitute one of the world's major natural ecosystems as well as forming the basis of our agriculture. Natural grasslands (prior to industrial man) once covered nearly 40% of the earth's surface. Today, much of that grassland is used for crop production and the remainder has been greatly altered by domestic livestock, suppression of fire, and development. Grasslands are plant communities dominated by graminoids (grasses, sedges, rushes) but with forbs (wildflowers) present and sometimes seasonally dominant. Trees and shrubs may be present but would be scattered in the grassland. Grasses and wildflowers of the grasslands are well adapted to the environment in which they exist where periods of defoliation or limitations of growth may occur due to climatic limitations, herbivore consumption, or removal of fire. Grasses have two unique features that make them more tolerant of defoliation and subsequent regrowth than most other plants. The meristem or growing point of grass tends to be close to the ground or beneath allowing it to resist

defoliation, normal grazing, and other stresses while allowing for regrowth. Grasses have a finely divided dense root system, which allows them to efficiently capture water and nutrients from a large volume of soil. This also contributes to their ability to bind soil particles together and reduce erosion. There is a general relationship in that taller grasses tend to have deeper root systems while shorter grasses have shallower root systems. Grasses are typically classified as to their height at maturity; tall grasses greater than four feet high, mid grasses two to four feet high, short grasses less than two feet. Grasslands are then grouped into classifications such as tall grass prairie, etc.

In comparison to forested ecosystems, grasslands have large annual temperature variations, high evaporation-precipitation ratios, and relatively low precipitation rates. The annual phenomenon of seasonal drought (July, August, September for our area) as well as periodic droughts that may last for more than one year are characteristics of grasslands. Climate alone does not adequately identify why a particular grassland exists at a given time and place. Other factors including soil conditions, fire and grazing animals interact to create and maintain grasslands. Generally as we go east to west in Texas the climate tends to have less precipitation and is more conducive to grasslands but we see woodland in grassland regions due to disturbance by man (overgrazing, farming, etc.)

To fully appreciate a grassland community it must be observed an entire year since it changes its character from season to season as each of its components species responds to the varying photoperiod (hours of sunlight), temperature, and moisture regimes. Studying a particular grassland is like reading a book, as each page is turned more of the story is revealed.

The last aspect to understand about grasslands is the climax community. Within a given climatic region a particular habitat can be expected to develop a relatively stable community, which is called a climax community. This community is not static but rather exhibits a state of dynamic equilibrium, that is, it varies around a mean set of conditions. If abnormal conditions occur, such as overgrazing, the community can be expected to change. If the disturbance factor is removed and if the community is not deteriorated, then the community will tend to go back to climax condition. This recovery to climax condition is dependent on a number of factors: 1. Soil seed reserves 2. Persistence of vegetative portions of plants 3. Degree of soil deterioration 4. Degree of growth form shift (grasses versus woody species) 5. Other variables.

Now we might ask, what is a prairie? A prairie is a grassland in humid (greater than 25 inches annual precipitation) regions dominated by tall grasses and having a diversity of associated forbs (wildflowers). Typically the topography consists of gently rolling hills. Plains are typically drier and flat.

Hopefully this mini-course in grassland ecology will help one to understand the results of the Tandy Hills study and also its importance in the Fort Worth region.

Study Area and Methods

The areas considered in this study are the 105.25-acre Tandy Hills Park, 50-acre Stratford Park, and the adjoining lands east and west of Tandy Hills Park. Elevations range from 643 to 525 ft. The study area is situated in the Fort Worth section of the Grand Prairie where it approaches the Trinity River bottoms.

Soils of our region generally determine what plant community should exist. Soils that have a clay loam or clay surface layer are indicative of mid and tall grass prairies. Soils that have a fine sand or fine sandy loam are indicative of oak forests. Three soil types are found at the study area: Aledo-Bolar-Urban land complex on 3% to 20% slopes; Aledo-Urban land complex on 1% to 8% slopes; Frio silty clay frequently flooded. Most of the soils in the study belong to the Aledo-Bolar series and are primarily found on the slopes and hillsides. The Aledo soil is the next most abundant soil and is found primarily on the flat hilltop areas. A small portion of the study area soils is the Frio silty clay loam and is located in the creek bottoms near Interstate 30. The Aledo and Aledo-Bolar soils are indicators (among other soils) of Prairie in Tarrant County. The Frio soil is indicative of creek bottom. So in just examining the soil survey of Tarrant County one has expectations of most of the park being in grass.

The two parks belong to the City of Fort Worth and are operated by the Park and Recreation Department's south zone park operations. The private property to the east belongs to the Sagamore Hill Baptist Church. A real estate company currently lists the private property to the west and this author has not determined the owner.

Methods used in the study involved weekly visits during spring and early summer to every two weeks in mid-summer and fall. Visits consisted of walking through most of the park and observing the plant species in bloom, the numbers of individual species, making note of general topography, disturbed sites, and off road vehicle activity. Ninety-five percent of the time spent at the study was in the Tandy Hills portion. Other methods used were examining aerial photographs, interviewing Lewis Tandy, searching for scientific papers, and trips to other prairie areas for comparison. See Fig. 1 for map of park boundaries.

Study Results

As stated in the introduction, Fort Worth is found in the prairie area of the Crosstimbers and Prairies vegetational region. The major study of the Fort Worth Prairie was prepared by E. J. Dyksterhuis in 1946, published in *Ecological Monographs* vol. 16, number 1. Much of the background information for this study was provided by this valuable work on the prairie and was also used as a standard for evaluating Tandy Hills.

Much of the prairie that existed in the Fort Worth Prairie was still intact in the 1870s but by 1900 most of the prairie had disappeared, been degraded, or had declined. Overgrazing by domestic livestock and farming of wheat and cotton were the major factors leading to the demise of the prairie. In many areas where prairie still exists the land is situated on slopes that were less desirable for livestock and unsuitable for farming;

this is the case with Tandy Hills. Examining aerial photos from the early 1940s indicate that Tandy Hills was in excellent shape and at that time had less woody growth whereas the Stratford Park area was already very woody. It is interesting to note that both Tandy Hills and Stratford have basically the same degree of slope and the same soil types but Stratford is dominated by woody vegetation (see fig. 2). This reflects differences in land use before 1940. Conversations with Lewis Tandy (the family owned the land from before the turn of the century until the 1930s) support the fact that Tandy Hills was never abused like much of the surrounding land.

Four major climax grasses occur in the Fort Worth Prairie: Little Bluestem, Sideoat Gramma (our state grass), Indian Grass, and Big Bluestem. All of these grasses occur in the park and in the manner described by Dyksterhuis; shorter grasses on the shallow soil on the hilltops with the taller grasses on the slopes. One peculiarity of the Fort Worth Prairie is the occurrence of flat, bench-like regions dominated by the prairie grass Seep Muhly. These are referred to as Muhly benches. Tandy Hills has many of the benches and all are in good shape except where used for previous vehicular travel. In regards to prairie grasses in an undisturbed state, the slopes of Tandy Hills Park are among the best in the county and I believe the best anywhere in the City of Fort Worth (including the Nature Center). The area in the park that has been maintained by mowing has the fewest climax grasses although some have survived. The decreased mowing helped identify the grasses that had survived as well as numerous wildflowers.

Wildflowers are what really make Tandy Hills a special area. Although many areas have the climax grasses for our region, few have many wildflowers. The scarcity of wildflowers can be attributed to overgrazing and their inability to recover from grazing. Most wildflowers are very palatable to livestock at different stages and these forbs make up an important part of the diet of livestock. So even though there are large areas of native prairie west of Fort Worth they have a low diversity of wildflowers (though most species can be found if you look in a large area for a long time).

Tandy Hills wildflowers are in the right place and the right amounts (almost all pioneer accounts mention the beauty and numbers of wildflowers) and it is from my observations the best place in Fort Worth for native wildflowers. Although there are many species of flowering plants at Tandy Hills (see plant list) some stand out in either their numbers or their rarity. Purple Paintbrush abounds in the park particularly near View Street as does a red Winecup that is found in its rare white form. On the edge of the slopes the Engleman's Sage is numerous and in greater number than I have seen anywhere (if occurs only in 3 or 4 Texas counties). Dog Tooth Violet is too numerous to count and are uncommon in the rest of the county. Compass Plant and Rosin Weed are considered prairie indicators anywhere in the prairie states. These two plants are numerous and occur side by side (a condition I have not seen elsewhere). Purple Prairie Clover, White Prairie Clover, Purple Coneflower, and Prairie Celestial occur in impressive numbers. One plant identified has not been located anywhere else in North Texas and is uncommon in Central Texas. This plant has no common name, its scientific name is *Tomanthera Multiflora*. This colony that was found has thousands of individuals. All plants were identified by use of the Manual of the Vascular Plant of

Texas and Shinner's Manual of the Flora of North Central Texas. Dora Sylvester of the Botanical Research Institute of Texas verified many of the findings. The *Tomanathera*, was confirmed by Dr. Mahler of SMU.

The damage done by off road vehicles, four wheel drives, motorcycles, and water department activities are certainly noticeable. Many of the roads and trails have been in place for many years and some are recent. Examining aerial photos of 1981 and 1987 indicate at least a 100% increase in damage to the park. There were few times when I surveyed the park that I did not see evidence of this activity. Many times I would see the offender but could never get to them in time to catch them.

Vehicle usage in the park appears to have decreased a small amount recently. Areas where roads and trails exist are showing little signs of recovery. This takes a long time and since this year was a hot one with little rain recovery would be slower. Vehicle entry is still on the western and eastern sides. The activity in the park by the survey company that the Water Department had contracted for was noticeable in the summer 1988, and I understand that it is now completed. The Water Department will need to advise the park staff of any proposed activity in the future.

Little time was spent in Stratford Park but I thought that Tandy Hills warranted the most attention. Time was spent on the church property and in general what can be said for Tandy Hills can be said for this property also, because the areas on that property are contiguous with the prime areas of Tandy Hills. Stratford Park warrants further study in the future.

Tandy Park Plant List

The following plant list was prepared from summer of 1987 through the winter of 1988. This is not a complete list of all species in the park and does not include the woody plants. Most are considered prairie species. Entries are also not in alphabetical order; due to the way they were entered on our computer.

Grasses:

1. *Schizarachyrium scoparium* ---- Little Bluestem
2. *Sorghastrum nutans* ---- Indian Grass
3. *Andropogon furcatus* ---- Big Bluestem
4. *Panicum virgatum* ---- Switch Grass
5. *Bouteloua hirsuta* ---- Hairy Gramma
6. *Bouteloua curtipendula* ---- Sideoats Gramma (state grass of Texas)
7. *Muhlenbergia reverchonii* ---- Seep Muhly
8. *Stipa leucotrica* ---- Texas Wintergrass
9. *Buchloe dactyloides* ---- Buffalo Grass

Wildflowers:

10. *Dyschoriste linerasis* ---- Snake Herb
11. *Ruellia humilis* ---- Wild Petunia
12. *Ruellia caroliniensis* ---- Wild Petunia
13. *Rhus toxicodendron* ---- Poison Ivy
14. *Cooperia drumundii* ---- Brazos Rainlilly
15. *Amsonia ciliaa* ---- Bluestar
16. *Asclepias asperula* ---- Antelope Horn Milkweed
17. *Asclepias viridis* ---- Green Milkweed
18. *Matelea biflora* ---- Two-flowered Milkweed
19. *Lithospermum incisum* ---- Puccoon
20. *Tradescantia occidentalis* ---- Prairie Spiderwort
21. *Centaurea americana* ---- Basket Flower
22. *Echinacea angustifolia* ---- Purple Coneflower
23. *Engelmannia pinnatifida* ---- Cutleaf Daisy
24. *Erigeron strigosus* ---- Daisy Fleabane
25. *Gallardia pulchella* ---- Indian Blanket
26. *Helianthus maximiliani* ---- Maximilian Sunflower
27. *Liatris mucronata* ---- Gayfeather
28. *Ratibida columnaris* ---- Mexican Hat
29. *Silphium lacinatedum* ---- Compass Plant
30. *Silphium albaflorum* ---- White Rosinweed
31. *Sabata compestris* ---- Prairie Gentian
32. *Nemastylis geminiflora* ---- Prairie Celestial
33. *Krameria lanceolata* ---- Prairie Sandbur
34. *Salvia texana* ---- Texas Sage
35. *Salvia azurea* ---- Blue Sage
36. *Salvia engelmanni* ---- Englemans Sage
37. *Scutellaria drummondii* ---- Drummonds Skullcap
38. *Brazoria scutellarioides* ---- Prairie Brazoria
39. *Nothoscordium bivalve* ---- Crow Poison
40. *Desmanthus illinoensis* ---- Bundleflower
41. *Desmanthus velitinus* ---- Shameweed
42. *Crindelia microcephalla* ---- Gumweed
43. *Castilleja indivisa* ---- Scarlet Paintbrush
44. *Castilleja prupures* ---- Purple Paintbrush
45. *Castilleja purpura* var. *Lindbeimeri*
46. *Lupinus texensia* ---- Texas Bluebonnet
47. *Petalostemun purpureum* ---- Purple Prairie Clover
48. *Allium canadense* ---- Canadian Onion
49. *Allium drummondii* ---- Prairie Onion
50. *Linum rigidum* ---- Yellow Flax
51. *Linum pratense* ---- Blue Flax
52. *Linum sulcatum* ---- Yellow Prairie Flax
53. *Yucca pallada* ---- Palid Yucca
54. *Yucca arkansana* ---- Thready Yucca
55. *Callirhoe involucrata* ---- Winecup

56. *Calyophus serrulata* ---- Day Primrose
57. *Oenothera biennis* ---- Common Evening Primrose
58. *Oenothera missouriensis* ---- Fluttermill
59. *Stenosiphon linifolius* ---- False Gaura
60. *Ipomopsis rubra* ---- Standing Cypress
61. *Polygala alba* ---- White Milkwort
62. *Hedyotis nigricana* ---- Star Violet
63. *Verbena bipinnatifida* ---- Prairie Verbena
64. *Verbena halei* ---- Slender Vervain⁹
65. *Erodium cicutarium* ---- Filaree
66. *Erodium texanum* ---- Stork's Bill
67. *Geranium carolinianum* ---- Crane's Bill
68. *Ceanothus americanus* ---- Redroot
69. *Erythronium albidum* ---- Dog's Tooth Violet
70. *Phyllanthus polygonoides* ---- Leaf Flower
71. *Tragopogon dubius* ---- Yellow Goat's Beard
72. *Hybanthus verticillatus* ---- Green Violet
73. *Cacalia plantaginea* ---- Indiana Plantain
74. *Vicia sativa* ---- Spring Vetch
75. *Schrankia uncinata* ---- Sensitive Brier
76. *Lindheimera texana* ---- Texas Star
77. *Delphinium virescens* ---- Plains Larkspur
78. *Astragalus mollissimus* ---- Texas Loco
79. *Astragalus crassicaarpus* ---- Ground Plum
80. *Psoralea cuspidota* ---- Tall Scurvy Pea
81. *Psoralea linerifolia* ---- Straight Leaf Psoralea
82. *Palafoxia callosa* ---- Small Palafoxia
83. *Polytaenia nuttallii* ---- Prairie Parsley
84. *Eryginum leavenworthii* ---- Eryngo
85. *Solanum dimidiatum* ---- Western Horsenettle
86. *Solanum rostratum* ---- Buffalo Bur
87. *Penstemon cobaea* ---- Wild Foxglove
88. *Eustoma grandiflorum* ---- Bluebells
89. *Dyssodia tagetoides* ---- Dogweed
90. *Lygodesmaia texanna* ---- Skeleton plant
91. *Boerhavia coccinea* ---- Scarlet Spiderling
92. *Thelesperma filifolium* ---- Greenthread
93. *Veronia lindheimerii* ---- Lindheimer's Ironweed
94. *Heliotropium tenellum* ---- Teliotrope
95. *Aster ericoides* ---- Heath Aster
96. *Hymenopappus scabiosseus* ---- Old Plainsman
97. *Marshallia caespitosa* ---- Barbra's Buttons
98. *Euphorbia bicolor* ---- Snow on the Prairie
99. *Centaurium beyrichii* ---- Mountain Pink
100. *Sisyrinchium app.* ---- Blue Eyed Grass
101. *Monarda citriodora* ---- Lemon Horsemint

102. *Monarda punctata* ---- Yellow Horsemint
103. *Cassia romeriana* ---- Two Leaf Senna
104. *Dalea frutescens* ---- Shrubby Dalea
105. *Psoralea cuspidata* ---- Tall Scurvy Pea
106. *Neptunia lutiea* ---- Yellow Puff
107. *Proboscidea lousianica* ---- Devils Claw

Management

Management of natural areas is accomplished across the nation on federal, state, city, and private lands. Although it has recently become a science instead of an art, management of natural areas has been practiced in some form or another for years. Most federal and state agencies have lands to manage and a professional staff of natural area managers, but most city governments do not usually deal with natural areas or seek the staff do so. There are exceptions. In Texas, the City of Austin has a natural preserve system and a preserve manager, which answers to Austin Park and Recreation. They also have a department of Environmental Protection with a section on environmental planning which includes a nature preserve technical advisor. Even New York City, which most Texans stereotype as a city with very little green space, has a department of natural resources.

The City of Fort Worth and its citizens must first decide the value of the natural areas within the city limits and then decide how to manage them. It is not an easy decision to make due to the current budget restraints and needs in so many areas. But it will take the time and attention of city staff to carry through any management plan. The following management scenarios are suggestions of policies that the city could implement.

1. The “let nature take care of it” scenario: This type of management is the most commonly practiced. It consists of letting natural processes manage the areas in question. The immediate costs are little and the public gets years of use from the land. But in the long run, the area gradually degrades from what made it special in the first place. Few areas are truly untouched by man and nature will take a different course because of these disturbances. At Tandy Hills the problem is brush and tree invasion and in 20 to 50 years it will probably lose most of its special nature. When dealing with Natural Area Management and Preservation one is dealing with the next and future generations of citizens. It is a long-term process!
2. The “save the best” scenario: This scenario involves the identification of the best parts of a proposed natural area and doing all that can be done to keep these areas in a natural condition. The areas that are considered in need of more work and restoration are left to nature and its altered course. At Tandy Hills this management plan would involve minor brush clearing, mowing, and prescribed burns. Cost would be determined by the extent of the areas selected to be managed and preserved.

3. The “restoration” scenario: This scenario is much like what would be undertaken if a Rembrandt or Renoir painting were discovered in your great uncle’s damp basement. Art lovers would be excited, museums would be excited, and restoration artists would be excited. Great care would be taken in handling the painting, molds would be carefully removed, and the exact paint pigments from Europe would be mixed and painted in the same strokes as the great masters. It would then be displayed with great pride for all to see. It may be a matter of opinion as to the value of Tandy Hills but if the city determines that the park needs to be restored, the following could be a management plan. Removal of all woody growth over many years, reseeding of disturbed areas with seeds from local genetic stock, prescribed burns as needed, transplanting wildflowers grown in the Nature Centers native plant nursery, and protecting the area from further disturbances. Then display it proudly.

All of the scenarios above assume that the park will be protected from Off Road Vehicles.

Educational and Recreational Potential

Education at Tandy Hills could be very similar to that at the Nature Center. Programs and trail walks explaining the ways of nature (ecology) and what its value to man is (environmental ethics) is a central theme in children and adult programming that is done at nature centers. Other programming would include wildflower walks, prairie ecology, and the history of “Cowtown”. Such programming would require a trail system (example in fig. 1), staff from the Nature Center and volunteers. The programs are limitless and are dependent on a varied staff at the Nature Center. The current limitations are that even at our allotted staffing level we would be hard pressed to do many programs at Tandy Hills. Travel time is about one hour, and the average tour takes almost one and one half-hours. Add briefing and debriefing of the volunteers and a staff member has spent half the day doing one tour. There is no problem spending this amount of time but it would put a strain on the Nature Center’s programs and daily operations.

Resource-oriented, non-structured recreation would be the same as that found at the Nature Center. This includes hiking at a leisurely pace, bird watching, wildflower observing, and just enjoying natural surroundings. Its location would be a benefit to citizens of the east and south sides of Fort Worth. This type of unescorted use of the park would be dependent on a properly designed trail system and the use of interpretive signs and literature.